

## Spotlight Project: *Projectile Motion*

# P R O J E C T O V E R V I E W

page 1

<b>Name of Project:</b>	Projectile motion			<b>Duration:</b>	2 weeks		
<b>Subject/Course:</b>	math (Algebra II/Trigonometry)			<b>Grade Level:</b>	11		
<b>Other Subject Areas to Be Included:</b>	Physics						
<b>Project Idea</b> Summary of the challenge, investigation, scenario, problem, or issue:	Students work in teams to design and construct a ballistic device that launches an object in a flight path that follows a parabola. They use low cost materials (PVC pipe, plywood, rubber bands, etc.) to build the device, which must be capable of repeated firings. Students use knowledge of quadratic functions in order to hit a target. Each team conducts multiple tests and use the data they record to redesign their device if needed. Students make an oral presentation using PowerPoint slides to summarize their findings.						
<b>Driving Question</b>	How can we build a device to launch a projectile, and calculate its motion in order to hit a target?						
<b>Content and Skills Standards to be addressed:</b>	<p><u>Students will be able to:</u></p> <ul style="list-style-type: none"> <li>• use two-dimensional equations of motion for projectile motion to calculate initial velocity, time in the air, horizontal distance and maximum height.</li> <li>• use trigonometry to resolve two-dimensional vectors into its vertical and horizontal components</li> </ul> <p>• Graph quadratic equation and find x-intercepts, y-intercepts and vertex</p> <p>• Apply factoring, quadratic formula and graphing calculator to find x-intercepts of a quadratic graph</p> <p><u>CA Content Standards</u> - Algebra II: 8.0, 10.0; Trigonometry: 12.0, 19.0; Physics: 1j, 1j</p>						
<b>21st Century Skills</b> explicitly taught and assessed (T+A) or encouraged by project work, but not taught or assessed (E):	Collaboration	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Other: Critical and Creative Thinking; Problem Solving	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	Presentation	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
	Critical Thinking:	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
<b>Culminating Products &amp; Performances</b>	<b>Group:</b>	Design Proposal Complete Ballistic Device main Test Report			<b>Presentation Audience:</b> <input type="checkbox"/> Class <input type="checkbox"/> School <input type="checkbox"/> Community <input type="checkbox"/> Experts <input type="checkbox"/> Web <input type="checkbox"/> Other: _____		
	<b>Individual:</b>						

## P R O J E C T O V E R V I E W

page 2

<b>Entry Event</b> to launch inquiry and engage students:	Activity: Paper wad tossing contest (try to hit wastebasket, tossing over students of varying heights) Video: Scenes from last year's project (final tests of projectile launch devices)				
<b>Assessments</b>	<b>Formative Assessments</b> (During Project)	Quizzes/Tests	<input checked="" type="checkbox"/>	Practice Presentations	<input checked="" type="checkbox"/>
		Journal/Learning Log	<input type="checkbox"/>	Notes	<input type="checkbox"/>
		Preliminary Plans/Outlines/Prototypes	<input checked="" type="checkbox"/>	Checklists	<input type="checkbox"/>
		Rough Drafts	<input type="checkbox"/>	Concept Maps	<input type="checkbox"/>
		Online Tests/Exams	<input type="checkbox"/>	Other:	<input type="checkbox"/>
	<b>Summative Assessments</b> (End of Project)	Written Product(s), with rubric: _____	<input type="checkbox"/>	Other Product(s) or Performance(s), with rubric: _____	<input type="checkbox"/>
		Oral Presentation, with rubric	<input checked="" type="checkbox"/>	Peer Evaluation	<input checked="" type="checkbox"/>
		Multiple Choice/Short Answer Test	<input checked="" type="checkbox"/>	Self-Evaluation	<input checked="" type="checkbox"/>
		Essay Test	<input type="checkbox"/>	Other:	<input type="checkbox"/>
	<b>Resources Needed</b>	<b>On-site people, facilities:</b>	large open area for constructing and firing ballistic devices; other teachers and aides as available to help with construction		
<b>Equipment:</b>		measuring tape, LCD projector			
<b>Materials:</b>		low cost materials (PVC pipe, plywood, rubber bands, etc.) which may be provided or that students may collect			
<b>Community resources:</b>		none			
<b>Reflection Methods</b>	<i>(check all that will be used)</i>	Journal/Learning Log	<input type="checkbox"/>	Focus Group	<input type="checkbox"/>
		Whole-Class Discussion	<input type="checkbox"/>	Fishbowl Discussion	<input type="checkbox"/>
		Survey	<input checked="" type="checkbox"/>	Other:	<input type="checkbox"/>

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## Spotlight Project Sample: American Archetypes

PROJECT TEACHING AND LEARNING GUIDE		
<b>Project:</b> American Archetypes		<b>Course/Semester:</b>
Knowledge and Skills Needed by Students to successfully complete culminating products and performances, and do well on summative assessments	Scaffolding / Materials / Lessons to be Provided by the project teacher, other teachers, experts, mentors, community members	
Business communication	→	Students write resumes and cover letters — instruction, including samples and templates, provided by counselor (peer editing of drafts, final edits by counselor)
Online research skills	→	Evaluating website accuracy activity (online and worksheet). Effective search (engine) techniques activity led by teacher
PowerPoint and Excel	→	Instruction in software use provided by computer applications teacher
marketing tools and techniques	→	Weekly visits by local business partners with expertise in marketing and product development. Students begin email exchanges with experts.
Presentation skills	→	<div>Video review of students presentations</div> <div>mock presentation by instructor</div> <div>Jigsaw activity to learn presentation rubric</div> <div>Peer assessment (using rubric) of practice presentations</div>
Report writing	→	Direct small-group instruction on the features of report writing by instructor. Peer editing of drafts, final drafts by teacher. Direct small-group instruction on MLA Citations (including online bibliography generators). Jigsaw activity to learn report writing rubric
U.S. history content knowledge	→	Textbook review, lectures, research-based worksheets, objective weekly quizzes, online research

## Spotlight Project Sample: *Design and Attract*

# P R O J E C T C A L E N D A R

**Project:** Design and Attract

**Start Date:** Feb. 2

M O N D A Y

T U E S D A Y

W E D N E S D A Y

T H U R S D A Y

F R I D A Y

### P R O J E C T W E E K O N E

Grabber: memo from Middleburg University  
Know/Need to Know list  
Project Teams Announced  
Discussion of expectations for team work  
First team meeting: roles, contract, initial task list

Explanation of Project Details, Procedures  
Explanation of rubrics for major products  
Review samples of professional products in relation to rubric  
Team meeting: task list  
Daily team assessment

Design Software review (taught prior to project)  
Lesson: Assessing client needs  
Team work time: begin assessment of client needs  
Homework: Reading on assessing client needs  
Daily team assessment

Lesson: Design theory  
Team work time: continue assessment of client needs; begin brainstorming ideas for materials  
Homework: complete client needs assessment (due Mon.)  
Daily team assessment

Checkpoint: Quiz on Design Theory  
Team work time: begin design of materials  
Review/Revise Know/Need to Know list  
Daily team assessment; meeting with team leaders

### P R O J E C T W E E K T W O

Checkpoint: collect "Client Needs Assessment"  
Team work time: Continue designing materials  
Homework: notes on initial ideas due tomorrow  
Daily team assessment

Checkpoint: Collect notes on initial ideas for materials  
Checkpoint: Teams meet with others to critique work in progress  
Team work time: discuss feedback from critique  
Daily team assessment

Lesson: Typography review  
Team work time: Continue creating materials  
Review/revise Know/Need to Know list  
Daily team assessment

Checkpoint: Quiz on typography  
Explanation of rubric for presentation of products  
Team work time: Continue creating materials  
Daily team assessment; meeting with team leaders

Checkpoint: Teams meet with others to critique work in progress  
Team work time: Continue creating materials, planning presentation  
Daily team assessment  
Homework: Continue creating materials

### P R O J E C T W E E K T H R E E

Team work time: Finish creating materials, planning presentation  
Checkpoint: Submit materials for teacher review  
Final review/revision of Know/Need to Know list  
Daily team assessment

Team work time: Prepare and practice presentation of materials  
Daily team assessment

Team work time: Prepare and practice presentation of materials  
Daily team assessment

Presentation Day

Self and Peer Assessment  
Project Debrief and celebration